



Microwave Scattering Observed in Convective Cells During CAMEX-4

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Remote Sensing With HAMSAR

HAMSAR:
"High Altitude MMIC Sounding
Radiometer"

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HAMSR/CAMEX Objectives

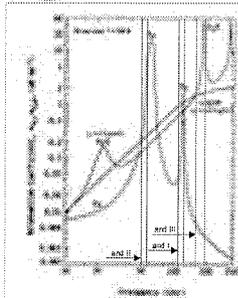


- Obtain microwave soundings of key atmospheric variables
 - In/around hurricanes & other tropical systems
 - Vertical sounding profiles
 - Temperature
 - Water vapor & liquid water
 - Ice: high frequency scattering
- Use derived geophysical parameters to study synoptics
 - Characterize state of local atmosphere
 - Study relevant processes
- Use scattering info to study precipitation
 - High frequency perspective

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HAMSR Measurement Specs



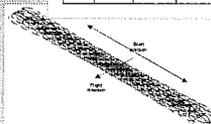
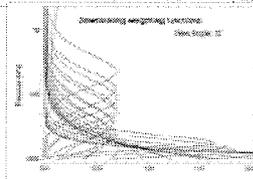
Direct measurements:

- Brightness temperatures in 25 channels
- Note: 118-GHz channels not operational for CAMEX

Derived measurements:

- Temperature profiles
- Water vapor profiles
- Liquid water profiles
- Surface to 100 mb
- 2-4 km layers

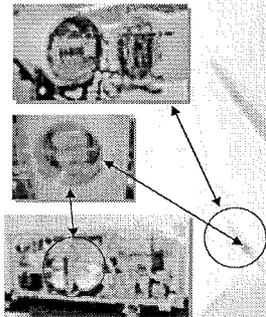
Chan #	Center freq. (GHz)	Offset (GHz)	Bandwidth (MHz)	W-tmic Peak (mb or mm)
I-1	118.75	-5.500	1500	SSC(10 mm)
I-2	"	-3.500	1000	Surface
I-3	"	-2.500	300	Surface
I-4	"	-2.000	500	1000mm
I-5	"	-1.600	400	750 mb
I-6	"	-1.200	400	400 mb
I-7	"	-0.800	2500	250 mb
I-8	"	-0.450	2500	150 mb
I-9	"	-0.215	2500	80 mb
I-10	"	-0.120	2500	40 mb
II-1	50.30	0	180	SSC(100 mm)
II-2	51.76	0	400	Surface
II-3	52.80	0	400	1000 mb
II-4	53.95	0.115	2500	750 mb
II-5	54.40	0	400	400 mb
II-6	54.94	0	400	250 mb
II-7	55.50	0	330	150 mb
II-8	56.02	0	270	90 mb
II-9	56.67	0	330	330
III-1	183.31	-1.70	4000	[11 mm]
III-2	"	-1.05	25000	[6.3 mm]
III-3	"	-2.0	25000	[4.2 mm]
III-4	"	-3.5	25000	[2.9 mm]
III-5	"	-5.0	25000	[1.7 mm]
III-6	"	-1.8	25000	[0.6 mm]
III-7	"	-1.0	25000	[0.3 mm]



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HAMSR Field Deployment



- HAMSR is integrated into ER-2 wing pod
- Pressure vessel gives HAMSR open window, operating at ambient pressure
 - Wing pod is pressurized
- One calibration target is heated
 - Second target at ambient temperature
 - $T_{hot} - T_{cold} > 60^{\circ} C$
- Data are recorded on flash card
 - Sufficient storage for 10 hours

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CAMEX-4 Mission



- CAMEX: Investigate hurricanes & tropical convection
- HAMSR role: Provide core atmospheric measurements
- Deployment: Right-forward ER-2 superpod
- Field base: Jacksonville Naval Air Station, FL
- Period: August 15 - September 24, 2001
- Outcome: Many successful flights; 80% up-time
- Data: Processing still on-going
- Of interest: Very substantial scattering observed
 - More than 100 K Tb depression in some cases
 - Case study: Hurricane Erin

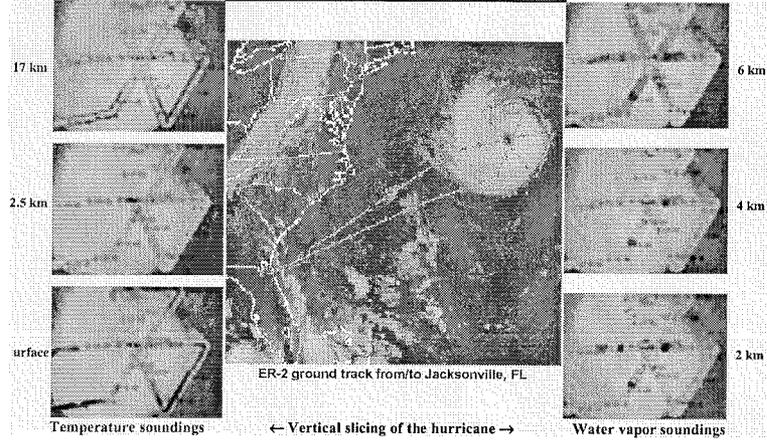
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Case Study: Hurricane Erin



Hurricane Erin - September 10, 2001



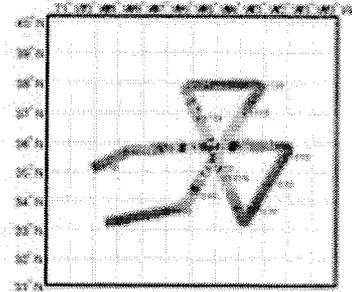
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Erin: 166-GHz "Window" Channel



HAMSR 166 GHz TB (10 Sep 2001 15:55:51 - 10 Sep 2001 16:58:44)



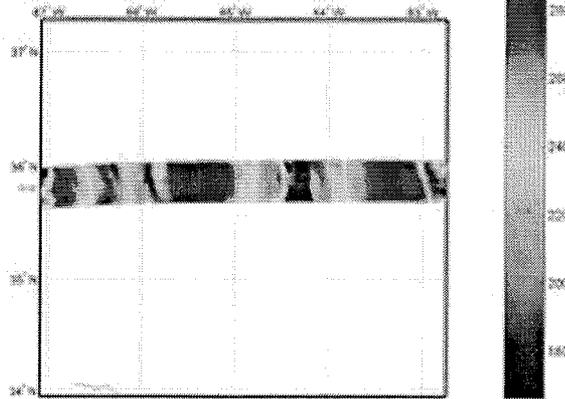
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Erin: 166-GHz - Close-up



AMS15R 166 GHz TB (19-Sep-2001 18:55:50 - 19-Sep-2001 19:59:30)



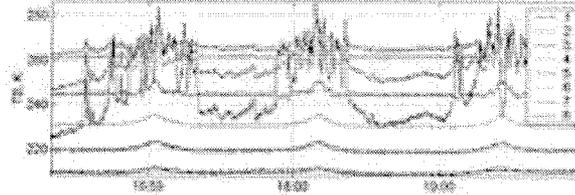
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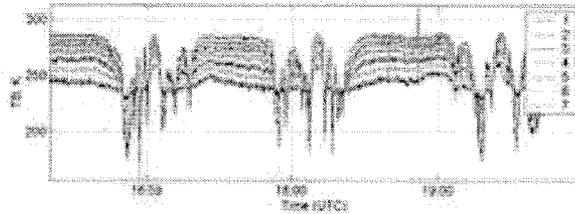
Erin: Vertical Slice at Nadir



AMS15R 66 Nadir TB (19-Sep-2001 18:55:50 - 19-Sep-2001 19:59:30)



AMS15R 166 TB



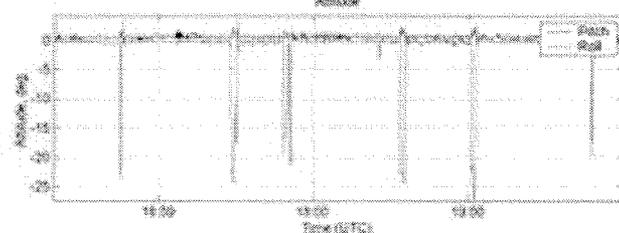
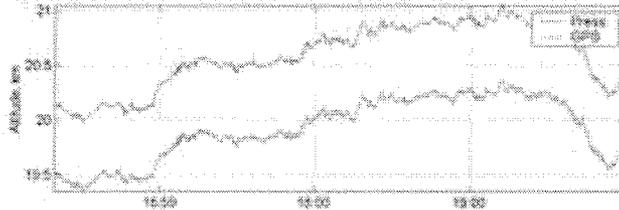
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Erin: ER-2 Altitude & Attitude



HAMOR Attitude (File: 01021014.SF011a30n, Start Time: 10-Sep-2001 14:27:07, End Time: 10-Sep-2001 22:04:30)



Erin Gallery

